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Sizing Up Information and Communication Technologies as Agents of political Pevelopment in Sub-Saharan Africa

Nicolas Alozie
Arizona State University

Patience Akpan-Obong
Arizona State University

William Foster
Arizona State University

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Abstract
It is widely speculated that the emergence of modern information and communication technologies (ICTs) will boost political development in the developing world. This expectation anchors on solid foundation since, presumably, the ICT revolution would radically alter access to information, dislodge entrenched social cleavages, and unleash new patterns of citizen consciousness and civic engagement by hitherto marginalized mass publics, and orchestrate new and decisive political equilibriums. In this research, we provide an empirical assessment of the impact of ICTs on political development in sub-Saharan Africa. Our analysis suggests that speculation about the potential for ICTS to enhance political development in the sub-Sahara is not unrealistic. The levels of phone, computer, and internet diffusion are associated with political development, although only the effect of the phone remains once other variables are specified. The phone is the most robust of all individual factors explaining variations in political development. However, t he effect of ICTs on political development can neither be certified as revolutionary, nor can they be codified as panacea.

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ABSTRACT

It is widely speculated that the emergence of modern information and communication technologies (ICTs) will boost political development in the developing world. This expectation anchors on solid foundation since, presumably, the ICT revolution would radically alter access to information, dislodge entrenched social cleavages, and unleash new patterns of citizen consciousness and civic engagement by hitherto marginalized mass publics, and orchestrate new and decisive political equilibriums. In this research, we provide an empirical assessment of the impact of ICTs on political development in sub-Saharan Africa. Our analysis suggests that speculation about the potential for ICTS to enhance political development in the sub-Sahara is not unrealistic. The levels of phone, computer, and internet diffusion are associated with political development, although only the effect of the phone remains once other variables are specified. The phone is the most robust of all individual factors explaining variations in political development. However, the effect of ICTs on political development can neither be certified as revolutionary, nor can they be codified as panacea.

Keywords:
Sub-Saharan Africa
ICTs
Political development
Social networks
Developing countries
Communication technologies
African development

1. Introduction

> "ICT is a chance for Africa. It is not, of course, a magic formula that is going to solve all the problems. But it is a powerful tool for economic growth and poverty eradication, which can facilitate the integration of African countries into the global market" (Kofi Annan 2002).[1]

Long before the ongoing mass political uprisings in North Africa and the Middle East, it was widely predicted that the emergence of modern information and communication technologies (ICTs) would boost democratization and political development. (See literature in Tettey, 2001, for instance.) This expectation was anchored on a foundation that the ICT revolution would radically alter access to information, dislodge entrenched social and political cleavages, unleash new patterns of citizen consciousness and civic engagement by hitherto marginalized masses, and generate new and decisive political outcomes (Wilhelm, 2000; McClurg, 2003; Oates & Gibson, 2006; Mossberger, et al., 2007). While this dynamic has long been envisaged in authoritarian and nascent democracies,[2] many analysts believe this is the definitive result of the 2008 U.S. presidential elections in which Barack Obama deftly deployed ICTs, particularly the internet, in mobilizing a virtual constituency and orchestrating the ultimate political triumph (Miller, 2008). In retrospect, the impact of ICTs on the outcome of the 2008 US presidential elections is mild in comparison with the recent sociopolitical upheaval in Tunisia, Egypt and elsewhere in Northern Africa and the Middle East. Tunisians began what has become known as "Revolution 2.0" (in acknowledgement of the role of ICTs and social networks) when their mass protests led to the end of President Zine El Abidine Ben Ali's 23-year administration. With the Tunisian success, Egyptians took to the streets and engaged in three weeks of mass protests that drew support from various sectors of the society through the power of social networks and mobilization. By February 11, 2011 President Hosni Mubarak had stepped down from a dictatorship that had lasted for 30 years (CNN, 2011).

Although ICTs continue to feature prominently in political and social activism throughout the developing world, account of the impact of ICTs on democratization and political development in sub-Saharan Africa has not been succinctly explored (Ott & Rosser, 2000; Yau, 2009). There are, as Tettey

(2001) aptly observes, ample anecdotal and, in some other realms fleeting, narratives of the interplay of ICTs and democracy in Africa (e.g., Kedzie, 1996). However, the substantive question of whether ICTs impact political development in the continent, while now beginning to get attention as given recent events in Egypt and elsewhere, remains unexplored. This research offers the first full assessment of the impact of modern ICTs on political development[3] in sub-Saharan Africa. We inquire explicitly whether ICTs contribute to political development in the sub-Sahara. If they do, are all ICTs pertinent? If ICTs matter, are their effects independent of other factors? We rely upon an internally consistent political development index of a battery of ten very broad issue-areas as our point of reference. Our results suggest that ICTs do matter. The levels of phone, computer, and internet penetration are allied with political development before other factors are specified. Once such other factors are netted out, only the effect of the phone sustains. This phone effect trumps that of any other singular factor in explaining inter-country variations in political development.

2. ICT Penetration in Sub-Saharan Africa

Different ICTs appeared in Africa at various points and in varying degrees of penetration. The computer was the forerunner to modern ICTs, with many countries and industries automating their processes incrementally in the 1980s (Obijiofor & Green, 2001; Mayer-Schonberger & Lazer, 2007). By the 1990s, internet connectivity had also taken hold with the first recorded access occurring in Makerere University in Kampala, Uganda (Akpan-Obong, et al., 2009; UNECA, 2009). Internet diffusion was accelerated by the 1996 African Information Society Initiative (AISI) on the auspices of the United Nations Economic Commission for Africa (UNECA). The AISI mandated African states to formulate policies consistent with the global information society (UNECA, 1996; Adeya, 2001). This translated into deregulation, as well as necessitated policy development for the internet sector. For the first time, licenses were granted for provision of telephone services to private telecom operators in many countries.

While internet connectivity occurred earlier on the continent, its expansion has been sluggish compared to that of mobile telephony (Sutherland, 2007). However, the ubiquity of shared accounts

"along with relatively high use of public access services such as telecenters and cybercafés" make it difficult for organizations such as the ITU to accurately account for the total number of internet users therefore understating internet diffusion (Jensen, 2003, p. 89). Mobile telephony gained ground for three main reasons. First, the kind of infrastructure (for example, electricity) required by the internet is poorly developed. Moreover, mobile telephony is not capital-intensive and utilizes more scalable technology, although cellular base stations often involves the provision of a generator for electrical power, which substantially increases the cost of deployment. Internet access was achieved initially through store-and-forward systems on platforms such as UUnet, FidoNet, and BitNet (Adeya, 2001). However, the 1990s saw the emergence of the first local Internet Service Providers (ISPs). They provided internet connectivity via dial-up, leased line and Very Small Aperture Terminals (VSATs). In most states, the pioneering ISPs were cultivated as value added resellers of internet connectivity but a competitive market soon developed. Initially, state-owned monopoly Posts and Telegraphs (P&T), which also provided internet access, considered expansion of the internet through local ISPs a dubious incursion into their domains. They were particularly alarmed by the prospects of Voice Over Internet telephony (VOIP) which were likely to divert traffic and revenue away from them.

The computer, closely aligned with the internet, is another ICT the growth of which has been hampered by lack of infrastructure; indeed, its growth has been much slower than those of both telephony and the internet. While cellular phones are deemed indispensable by many Africans, the computer remains mostly disconnected from the masses as fewer than five in 100 Africans own a computer and fewer have private access to the internet (ITU, 2009b). Of course this is related to the notoriously high cost and poor connectivity of the internet in Africa which are being addressed as many countries acquire more advanced technologies. For instance, a $250-million submarine fiber project, partly financed by the African Development Bank (ADB), was expected to boost international voice and internet capacity on completion (Omo-Ettu, 2009). As Omo-Ettu explains, it would provide faster connectivity at lower consumer costs through its 1.28 terabits per second broadband. Affordability is also being addressed

through the establishment of national internet exchanges (IXPs), which minimize costs of routing of national internet traffic through Europe and North America.

Nothing has transformed Africa in recent years as much, and as rapidly, as the cellular phone (Alozie, 2007; Bailard, 2009). Ironically, only a few years ago scholars were referencing sub-Saharan Africa as a region with fewer telephone lines than Manhattan, New York (Kenny & Keremane, 2007). This may still obtain, but cellular phone technology has radically altered telephony to the extent one can posit that Africans have since leapfrogged copper-wire technology. In many countries, several companies competed for and obtained expensive licenses to provide cellular phone service. These highly prized licenses are doled out to the "highest bidder" who not only tenders the highest official bid but can also "grease the palms" of government officials (Laffont, 2003). Though interconnection problems across networks have often occasioned gridlock for subscribers, demand and competition guaranteed rapid expansion of cellular phone service. The Nigerian experience was typical: as the interconnectivity crisis deepened, demand escalated as users sought to circumvent the difficulties by subscribing to multiple (sometimes, all available) networks (Akpan-Obong & Foster, 2007). Pre-paid schemes extend services to people willing (and able) to pay the initial fixed costs of a handset and phone number. These fixed costs were prohibitive initially but they have since plummeted to the point that virtually anyone can now afford cellular phone service. According to the ITU, "While prepaid tariffs tend to be more expensive (per minute) than postpaid tariffs" they are frequently chosen "because they are often the only payment method available to low-income users who might not have a regular income and will thus not qualify for a postpaid" plan (ITU, 2009a, p. 85). Indeed, about 95% of cell phone users in Africa utilize pre-paid services (Akpan-Obong, 2009). The cell phone has also become a medium of financial transactions, as phone credits are transacted as a form of electronic cash**.** The M-Pesa in Kenya, a Safaricom product is the most widely acclaimed utilization of cell phones for electronic money transfers (Hughes & Lonie, 2007). Through such innovative applications as the M-Pesa, mobile telephony has expanded into rural areas where it had previously not been contemplated. Many governments facilitated this expansion by

mandating rural service commitment from the licensed providers. By 2007 there were more than 275 million mobile phones in Africa, approximately 28 cellular subscriptions per 100 people (ITU, 2009b). Current trends to access the internet with fourth generation mobile technologies guarantee the continuing versatility of the mobile phone in the sub-Sahara (Karjaluoto, 2006).

3. Development Theory, ICTs, and Political Development in Sub-Saharan Africa

As the lead quote from Kofi Annan, former Secretary General of the U.N. conveys, conception of development in Africa is typically confined to the paradigm of economics, although this understanding of development based on economic prism postdates debates on state and institution building in post-colonial Africa (Needler, 1991). Indeed discussion about political systems in relation to African nations was neglected on the assumption that it was an inevitable derivative of economic development (Needler, 1991). Unavoidably, many scholars equally theorized political development from strictly an economic perspective convinced that "political development referred simply to the political changes that characteristically accompanied the various stages of economic development" (Needler, 1991, p.41). This changed in the 1950s. As the Cold War deepened, the world became more ideologically polarized, and there arose a need for explicit theories to explain the new structures and processes of self-governance in decolonized nations. These processes were described variously as "modernization" and "westernization" with their clear ideological biases toward the two axes of power, the U.S. and the Soviet Union (Rostow, 1960; Black, 1966). This generated theories to explain the distinctions in the political processes of the two polar powers and to provide prescription for policy and practice on the ideological options available to the emerging states (Organski, 1965; Pye, 1966). The U.S., through its scholars and expansive development networks, emphasized its capitalist democracy as the prototype toward which all other nations should aspire. Accordingly, American scholars defined political development as a model of "constitutional stability, high degree of participation, and role differentiation among public officials" (Needler, 1991, p.43). In short, this definition of political development was to be the archetype of the twin of a capitalist economic system in the cast of Weberian Protestantism.

Information and communication were cited as potent tools for rapid modernization through diffusion of western values. Thus the role of ICTs featured prominently in debates on the best strategy for bringing political development to sub-Saharan Africa. This was premised on the argument that for African countries to navigate the three levels of political development (traditional, transitional and modern), they needed exposure to values, attitudes and ideas of societies such as the U.S. that had already modernized through cultural diffusion. The mass media, particularly newspapers, radio and cinema, were conceived as the proper vehicles for transmitting these cultural values. Even as recent as 1997, the argument was still advanced on the significance of communication in development. According to the United Nations Food and Agricultural Organization (FAO), "communication is essential to overcome the constraints to development .... Rural communities should have at their disposal the tools to access and convey useful information and knowledge. They should be able to exchange experiences, knowledge and techniques, and be actors in the debate on development matters" (FAO, 1997, para. 2).

Given the prohibitive levels of illiteracy in these countries, advocates stressed the preeminence of the radio. According to the FAO, the radio is a tool for "democratic and pluralistic expression of the opinions, needs and aspirations of rural communities … and a means of raising public awareness and of Motivation" (1997, para. 3). Since there was little local content in radio programming, it was implicit that the transmitted information would be generated from outside the locality. Few nations in the sub-Sahara owned indigenous radio stations in the 1950s (Wilkinson, 1972; Andriantsoa, et al., 2005). Thus, many broadcasts were transmitted from Europe through repeater stations. The narrative behind the linkage of the mass media with modernization was extrapolated to framing the debate on the utility of ICTs for socioeconomic development in the 1990s. It was only later that researchers began to reflect on the effects of these technologies on political development (Amoretti, 2007). For instance, studies are emerging on ICT-mediated approach to governance (e-governance) particularly in service delivery (e.g., Mayer-Schonberger & Lazer, 2007) and mobile democracy (Castells, et al., 2007; Hermanns, 2008). However, the emphasis has consistently been on the democratizing traits of the technologies as almost anyone can

access them, including women and other traditionally disenfranchised political minorities who may partake in the body politic (Ott & Rosser, 2000; Tettey, 2001).

Despite the egalitarianism of ICTs, it is evident that sub-Saharan governments did not cultivate or embrace the technologies as agents of political development. In fact, if such an unpredictable outcome had been premised at the outset, many states would have rejected ICTs outright. The technologies gained acceptance among African elite because they were allied solely to economic development and not to some Marxian revolution that would destabilize existing class and power arrangements. Indeed, many African leaders have been so recalcitrant about it such that ICTs have been adopted as part of a mere "neighbor effect" ("keeping up with the joneses"), or in the case of mobile phones, the immense "kickbacks" accruing to government officials from corrupt practices associated with private licensing regimes. Nevertheless, some sub-Saharan nations, as evidenced by South Africa's *Chapter 2 Project,* have begun to actively cultivate ICTs as agents of political development (Fleming, 2002). However, the overwhelming impulse in many states remains censorship as adjuncts of the reluctance of the ruling elite in Africa to relinquish power (the "sit-tight" syndrome). The technologies, particularly the cellular phone, may have set in motion an inevitable process of mass interest and participation in sociopolitical systems on the continent.

3.1 Research Trajectory

Inquiry into the effect of ICTs on democratization or/and political development in Africa has spawned two strands of research. One thread, the most dominant, examines the impact of ICTs on patterns of democratic participation and civic engagement (e.g., Tettey, 2001; Fleming, 2002). Substantively, this research inquires whether the presence of ICTs has altered the content and mechanisms of governance. It spotlights various segments of the multi-dimensional subject of political communication and citizen participation and focuses on specific applications of ICTs. A rendition of this research is offered by Tettey (2001) who analyzed patterns of Ghanaians' participation on web-based discussion groups and concluded that "while technologies have expanded the amount and sources of

information that are potentially available to citizens, they have not resulted in any significant transformations in the way government is run or how politics are conducted on the continent" (p.135).

The second genre of research, the one to which our study more closely aligns, attempts to account for the "holistic" impact of ICTs on degree of democratization or political development. This research positions entire polities as units of analysis and then attempts to account for differentials in the democratization process given different levels of ICT diffusion. A glimpse of this research was offered by Kedzie (1996) who asked whether the status of ICT diffusion was a factor in explaining levels of democratization. Armed with data on 141 countries across all regions of the world, Kedzie's multivariate analysis demonstrated a strong linkage between level of ICT penetration and that of democratization. Additionally, his results suggested that the impact of ICTs on democratization was strongest in nascent democracies, including those in Africa. Although we consider our research to be a progeny of Kedzie's because his work was the first to link the level of democratization to modern ICTs in Africa empirically, certain key elements make our study distinctive. First, Kedzie's data originated in the early 1990s when both the internet and mobile telephony were still in their infancy in the sub-Sahara, and focused primarily on electronic mail connectivity. Second, Kedzie's study was a fleeting effort that, although it incorporated a lone dummy variable for Africa, it was not a substantive treatment of Africa or sub-Saharan Africa. Our study utilizes more contemporary data capturing deeper levels of both ICT diffusion and political development. Given the theoretical imperative of the linkage between ICTs and political development, we articulate the following working hypothesis to guide our analysis:

> **Hypothesis:** Greater levels of ICT penetration will have a positive effect on political development in sub-Saharan Africa. In our research, this translates into level of ICT penetration explaining inter-country variations in the political development index.

4. Data and Research Design

We focus on data from four standard sources for all 48 sub-Saharan African states (Table 2 has the listing of these states). Information on ICTs comes from International Telecommunications Union

(ITU). The World Development Indicators (WDI) provides population, education, and GDP data. The World Fact Book yielded data on ethnic composition and oil exporter status, while information on political development comes from Rotberg and Gisselquist (2008).[4] While Rotberg and Gisselquist have biennial data for 2000-2006 that could enable a quasi-time series design, they warn that some of the annual data are not from readily comparable sources. Accordingly, we focused on a cross-sectional design for 2006 since ICTs are still a work in progress in Africa and each ensuing year provides greater opportunity for gestation and probable impact.

4.1 Measuring Political Development

Although we did not uncover any ready-made measure of political development with universal acceptance applicable to the study, the literature outlines several essential elements of such a measure, including citizens' ability to choose their leaders and to hold those leaders accountable for their stewardship; the prevalence of political competition comprising, at a minimum, a ruling and an opposition group; a stable mechanism for transferring power from one group of elites to another through free and fair elections; freedom of the press and general attention to civil rights; judicial independence guaranteeing the individual a fair right of petition; a functional bureaucratic system of public institutions devoid of corruption; and a meaningful level of citizen participation, including incorporation of previously disenfranchised groups such as ethnic minorities and women (Pei, 2002; Randall & Svasand, 2002; Schneider & Schmitter, 2004; Berman, 2007). Our data set contains valid indicators that richly tap political development along these dimensions (Table 1). We sought to construct an additive Political Development Index (PDI) using the 11 factors arrayed in Table 1, such that higher scores on the index denote higher levels of political development.[5] These items are subjected to internal consistency and dimensionality tests using Cronbach's alpha and exploratory factor analysis as the diagnostic utilities.[6] The diagnostic profiles matched 10 of the 11, generating an alpha of .84 and an eigen value of 5.9 on the first factor, versus 1.4 on the second factor. Additionally, the first factor accounts for 59% of the total variance. The high coefficient associated with alpha indicates that the 10 items can reliably be summed

up to measure political development, while the outcome of the exploratory factor analysis suggests unidimensionality with respect to political development that the 10 items measure for each country.[7] Thus our regression models attempt to explain inter-country variance in the index, the mean of which is 28.81 reported in Table 2.[8]

(Place Table 1 about here)

4.2 ICTs and Other Explanators

We examine three ICTs of theoretical interest: phone (both fixed-line and cellular subscriptions),[9] computer, and the internet, each defined as level of usage per 100 inhabitants. While the number of ICTs explored in particular studies may, and do generally differ, there is consensus that level of diffusion is an appropriate measure of ICT penetration in a population.[10] We attempted to construct a three-item additive ICT index. However, the alpha which materialized precluded internal consistency. Subsequent diagnoses revealed a match for the computer and the internet (alpha = .84), but not in conjunction with the phone. We proceeded with all four measures as follows: phone, computer, internet, and an index of computer/internet.

Our control variables include the total populations of countries (logged to minimize size effects) – (Kedzie, 1996), educational attainment (percentage of the adult population completing primary school), ethnic composition (Tangri, 1985, p. 96-98) and oil exporter status (Ahemba, 2008). Other variables are GDP per capita (logged to minimize size effects), the growth rate of the GDP capturing on-going economic performance, and regional location. The coding for all variables appears in Table 2. While the theoretical bases for introducing these factors are apparent, two of the factors deserve further explication. The first is oil exporter status. Many nation-states opportuned enough to possess oil deposits in commercial quantities have capitalized on their natural fortunes to advance dreams of economic growth and development. Paradoxically, oil has been characterized as a "curse" in sub-Saharan Africa (Ahemba, 2008). Intractable agitation over control of oil deposits and revenues by stakeholders who feel especially aggrieved has been a destabilizing force in places such as Nigeria, a member of the Oil Producing and

Exporting Countries (OPEC) and sub-Sahara's largest net exporter of crude oil.[11] Not only has oil been a source of turmoil, but it has fostered public corruption and other malfeasance (O'Neill, 2007). Accordingly, we expect status as a net oil exporter to dampen political development. The other factor is regional location. There are various reasons this factor can be expected to explain inter-country variation in political development, not the least of which are regional political culture and spatial distribution of stress and strain all too familiar to observers of Africa. Moreover, we acknowledge the decisive ICT initiatives that have been engineered under the auspices of Regional Economic Communities that may, in fact, orchestrate uneven development. Examples include ICT for Regional Integration for the Economic Community for Central Africa states (CEMAC); Regulatory Harmonization in Economic Community for Western Africa states (ECOWAS); and Regional ICT Development in Southern African Development Community (Soltane, 2003). Accordingly, our classification of individual countries is based on the particular regional economic bloc to which each country belongs.

Given the nature and distribution of the dependent variable and our overall diagnostic results, we estimate our analytical models using OLS regression on the SPSS 17.0 platform. Our hypotheses are directional; thus, we employ both one- and two-tailed tests of statistical significance. The Ns on the regression models vary because some of the countries have missing observations on some of the control variables and therefore had to be omitted from the analysis.

5. Empirical Findings

The summary statistics are presented in Table 2. We have also reported the Pearson Correlations of all factors with the Political Development Index (column labeled PCOR). Overall, these data relay the dismal situation of the sub-Sahara all too familiar to African observers. The level of political development is clearly low across the board (mean=28.8), although the Southern and Western sub-Sahara appear to be eclipsing the East and Central. Our Mean of slightly more than 21 phone subscriptions per 100 inhabitants, as should be expected, is lower than the figure reported for Africa by ITU. However, the

standard deviation clearly suggests variability across countries. Finally, the sub-Sahara is a domain of both low educational and economic profile.

(Place Table 2 about here)

5.1 The Baseline Effects of ICTs

The baseline regressions of the effects of ICTs on the PDI are displayed in Table 3. These baseline results, although highly suggestive, are largely diagnostic given that they are zero-order effects which do not account for the effects of other control variables. First, these results propose that ICTs are successful in explaining inter-country variations in development. Second, the results suggest that all three ICTs are relevant with positive effects in that the level of diffusion of each ICT increases the level of development. Third, the results are highly suggestive of some hierarchical ordering in the effects of ICTs. Comparing both the standardized regression coefficients and the adj. R^2s, these results propose that the level of phone diffusion may exert the greatest effect on development. This remains true even when the coefficient for the combined effect of the computer and internet (.37) is compared to that of the phone (.46). A comparison of the standardized regression coefficients and the adj. R^2s suggests that the marginal effects of ICTs may outweigh their overall contributions to explaining inter-country variations in development.

(Place Table 3 about here)

5.2 Multivariate Effects of ICTs

Although the results presented in Table 4 come from multivariate specifications, we are still positioning them largely as diagnostic tools to offer more insights into the nature of the effects of ICTs. This is because the analysis does not specify ICTs as they operate in the real world. In other words, we have specified each ICT as though it functioned in a context independent of the other ICTs. The reality is that phones function in contexts where both the computer and internet also operate. This "ecological model" comes later in Table 5. For Table 4, we simply concentrate on articulating the nature of the effect of ICTs. First, the results for the F-ratios and Adj. R^2s suggest that these models are very successful in

explaining inter-country variations in political development. Secondly, the estimates themselves are both very stable and consistent. Looking first at the Model for the phone, a surprise of sorts emerges on the remarkable stability of the effect of this factor, down to the marginal effect of .46. A perusal of all the estimated standardized regression coefficients in Table 4 reveals that the effect of the level of phone penetration is as important as any other singular factor explaining development.

(Place Table 4 about here)

The results shown in Table 3 for the baseline models are not replicated in Table 4 for the computer and the internet. That is, the effects of the computer and the internet are not statistically distinct once other factors are taken into account. The last Model in Table 4 labeled "Model for Index" shows the results of the combination of computer and internet into a single ICT index. Again, these results do not replicate the baseline effects of the ICT index noted in Table 3. Overall, the new insights drawn from Table 4 on the relevance of ICTs are that: (1) the effect of the phone may well be the only ICT that will sustain specification of other factors; and (2), based on the size of all estimates, the phone effect may be as important as any other singular factor explaining inter-country variations in development.

5.3 Multivariate Effects of ICTs: Ecological Models

In the analysis in Table 5, we attempt to capture the actual context of ICTs by specifying the ICTs simultaneously. As we noted above, these ICTs do not act in isolation in the real world. To make the analysis more manageable, we have elected to work with the phone and the additive index of the computer/internet (ICT Index). We again begin with a baseline rendition and expand on it. Model 1 specifies the index of ICT (Computer/Internet) and phone as predictors. The results show that the effect of the index is not statistically distinct, while the phone retains the positive effect as noted in the previous analysis. We particularly highlight the fact that the marginal effect of the phone has become much more robust. Model 2 adds the interaction of the ICT index with the phone to Model 1. Neither the additive effect of the index, nor the interaction term achieves significance. Indeed, the decline in the adj. R^2 leaves little doubt that the interaction variable is irrelevant. At the same time, it is worthwhile noting that the

additive effect of the phone remains. Models 3 and 4 introduce the control variables of Table 4 into Models 1 and 2 analyses respectively. These results virtually replicate those noted in Table 4; except, this time, the marginal effect of the phone has rocked to the .80 level and the adj. R^2s reached 40 percent.

In all, the overriding picture that emerges from this analysis is that the phone is both the ICT of most relevance and the single most robust factor impacting political development. This is an important nuance because much attention has been lavished on the internet and the notion of "connectivity," although the peculiar qualities of the mobile phone that endears it to impoverished and scarcely literate mass populations of the kind evident throughout the sub-Sahara cannot be overstated. We conducted a different analysis to test for potential interaction effects of ICTs with other factors, including education. It indicated no such interactivity suggesting, quite simply that the effect of ICTs (the phone) on political development is largely independent of other factors. This is equally an important new insight. Analysts have widely theorized that ICTs are mere tools – by implication, they are expected to interact with other factors such as education. Our results urge caution. Unlike the computer and internet, mobile phone usage does not require any level of sophistication. That explains its ubiquity among sub-Sahara's mass illiterate populations as well as precludes the expected interaction between the phone and education in explaining political development.

(Place Table 5 about here)

5.4 Results for Control Variables

The results suggest that only the growth rate of the GDP and regional location explain variations in political development. The growth rate of the GDP is highly significant with robust positive effects. Regardless of the cast of variables, the estimated effects for this factor remained highly resilient. This underscores the dictum that economic performance promotes democratization and political development (Rowen, 1995). It should come as great news to those who argue that economic development clears the path to political development in developing countries. At the same time, the results give solace to others who insist that economic development alone cannot be the answer. The reference category for region is

Southern sub-Sahara (composed of 11 countries). Thus, the result reported for each region in Tables 4 and 5 compares that region specifically to the Southern sub-Sahara. There are only three states within the group we label as Island (Cape Verde, Comoros, and Seychelles). Our interest in separating this group is to ensure it does not compound our results for the other regions, not to generate realistic estimates for a three-observation dummy category. With the Island group isolated, we can concentrate on the results for the Western, Eastern, and Central regions. The consistently negative coefficients for these regions indicate that location in any region other than the South diminishes political development, although that differential is clearly not statistically distinct for the West.[12] The negative results for Eastern and Central sub-Sahara, as suggested by the summary statistics in Table 2, are particularly strong, reiterating that they are the least politically developed of all sub-Saharan regions.

6. Summary and Implications

Our purpose was to explore the nature of the effect of ICTs on political development in sub-Saharan Africa. We inquired whether ICTs contribute to explaining inter-country disparities in political development. If ICTs explain deviations in political development, we wanted to further establish whether all ICTs are equally relevant. Finally, if ICTs are germane, we sought to establish the extent to which their effects obtain independent of other factors. Although the data we examine are some of the richest and most carefully assembled pertaining to the sub-Sahara, we are cognizant of the one major caveat attendant to our study. We are using cross-sectional data to make a definitive statement about what clearly is a moving phenomenon not only involving cycles of technological infusion but, as Thies (2007) has correctly observed, comparatively youthful sub-Saharan states still at the threshold of state creation. Thus, like any piece of research, we do not pretend, neither is it our wish, to offer the last word on the relationship we explore here. Indeed, as we write, we contemplate the results of our study replicated 15 to 20 years into the future. Therefore, our findings, their interpretations, and extrapolations must be embedded within this limitation of cross-sectional data and timing.

We constructed a political development index, designed as our benchmark indicator of political development and regressed ICTs and other factors against the index. The results are compelling. Regarding the control variables, we found that economic performance and regional location are associated with political development. Countries cannot pick up and relocate in an attempt to alter their regional profile. They can, however, act to determine their economic destinies. While clearly not a panacea, attending to the dire economic situation in sub-Saharan states will yield positive results for political development. As our literature review evidenced, this potential has been echoed repeatedly by others, while discussion of the specific ways economic development advances political development is well-articulated in the literature (e.g., Lipset, 1959; Rowen, 1995).

Regarding our primary focus, we found that ICTs explain variations in political development across sub-Saharan states. When other factors, such as population and GDP, are not controlled for, all three ICTs – phone, computer, and internet – are pertinent. However when these factors are specified, only the effect of the phone remains. These results are such that the effect of the phone is the most robust of all single factors explaining inter-country variations in political development. Moreover, this effect is independent of the other factors. Two implications of this finding about the phone are noteworthy. First, the effects of ICTs on political development (at least the phone) are now isolable at the country level in the sub-Sahara. Secondly, the results capture a recurring theme that analysts, even casual observers, have known for some time about the patterns of ICT proliferation in the sub-Sahara. The phone, especially the mobile phone, has become the ICT of choice. This is so because of both the unassuming properties of the technology itself and other compelling derivatives of the sub-Saharan context. First, mobile telephone service is relatively cheap to acquire. Second, the technology is so user-friendly that one does not require any particular level of sophistication to engage it fully, a feature worthy of sub-Sahara's largely illiterate populations. Third, the technology offers instant access even in transit. Fourth, the technology has been able to bypass the kinds of severe infrastructural constraints that have hindered the old land-line technology. Combined, these attributes have allowed the mobile phone to mitigate the digital divide

among sub-Saharan Africans. Consequently mobile phones are ringing in sub-Saharan villages and outlying areas lacking in navigable roads and even piped water supply—according villagers the same power of communication enjoyed by their rural counterparts in advanced industrial states (Alozie, 2007). It has given voice to the voiceless and created sociopolitical awareness and agitation among people who would otherwise have been indifferent. As we noted earlier in this article, internet access through the computer has not diffused as widely as had been anticipated in the 1980s because of the heavy costs associated with acquisition of the computer and internet connection. However, smart phones bypass the computer and connect users, at least those who can afford it, directly and easily to the internet. It was this functionality of the cell phone that energized Revolution 2.0 as protesters in North Africa and the Middle East mobilized each other and the rest of the world on social networks such as Facebook, Twitter and YouTube. Indeed, Wael Ghonim, one of the front-line leaders in the Egyptian civil uprising, who described the events in Tunisia and Egypt as Revolution 2.0, credited the forced resignation of President Mubarak to Facebook and publicly thanked its founder, Mark Zuckerberg (CNN, 2011). Ghonim has also been widely quoted as saying: "If you want to free a society give them internet access" (Weintraub, 2011, para. 1).

One final and equally reinforcing inference needs to be drawn about the impact of ICTs (particularly the phone) on political development in the sub-Sahara by elaborating on a crucial point we alluded to in the previous section. A closer perusal of the results reveals some gap between the marginal effects of ICTs and their contributions to explaining inter-country variations in development. That is, while the phone appears to produce strong marginal effects, those contributions attenuate substantially when it comes to explaining actual inter-country variations in development. This dynamic yearns for some harmonization of theory and reality, a point underscored so aptly by Tettey (2001). Tettey admonished that whatever contributions ICTs may make to advancing African democracy, it is extremely naïve to overstate their prospects in a fictive atmosphere where qualifiers such as "revolutionary" and "transformational" have crowded out the reality on the ground. That ICTs may well have revolutionized

the social space of sub-Saharans is not contested. Yet, one must grapple with the reality that level of mobile phone penetration has far outpaced political development in the sub-Sahara (Bailard, 2009). Indeed, many of the polities readily classified as failed states are also domains of high ICT (especially mobile phone) diffusion. In Somalia, for instance, the mobile phone appears to be doing more to aid pirates coordinate their diabolical schemes of disrupting international shipping more than it is contributing to political development. Even Zimbabwe, by any measure a failed state, is also a domain of high mobile phone penetration. In Nigeria, ICTs are propagating and boosting all kinds of nefarious "419"[13] schemes at the same time that the country ranks in the lowest percentiles of the Afrobarometer (Bratton & Chang, 2006). Frankly, the results we have reported here cannot be codified as revolutionary with regard to the efficacy of ICTs. They are unequivocal on the fact that ICTs are contributing, but ICTs may not be the "magic bullet" for political development in sub-Saharan Africa.

Footnotes

1. Excerpted from the full text of Former Secretary-General of the United Nations, H.E. Kofi A. Annan's address to the Opening of the third meeting of the United Nations Information and Communication Technologies Task Force, at the United Nations Headquarters in New York on September 30, 2002. Full text of the speech reprinted in Okpaku, Sr. (2003, p. Xiii-XV).

2. Google's censorship in China is well chronicled (Bray, 2006). Other efforts to stifle ICTs have also been reported in Cuba, Iran, and North Korea. The mass riots, which followed Iran's 2009 contested presidential election results, prompted the Iranian government to order a disabling of cellular phone towers. Media outlets such as CNN reported their reliance on ireports, Facebook, MySpace, YouTube, and other online social networks to assess the situation in the country.

3. We are aware that some analysts examine the linkage between ICTs and advancement of democracy. We make no attempt in this study to distinguish between political development and democracy or democratization as concepts (Dahl, 1998; Grugel, 2002). Such a distinction is irrelevant to our thrust. For our purposes, both concepts are interchangeable.

4. Many of these variables are combinations of different indices. Their definitions are too expansive to articulate in the limited space of a journal article. Interested readers should visit: http://www.nber.org/data/iag.html. This information has also been encumbered and will be made available by the authors upon request.

5. Press freedom and property rights were re-coded to make them amenable to an additive index. The raw data for press freedom was coded such that a high score reflected poor performance. We devised a new inverted scale of 1-4 where better performance is accorded a higher score. Thus, the new scale has the highest scores for nations such as Benin, Cape Verde, Mali, Mauritius, Mozambique, Namibia, and South Africa that, according to the survey, are the best performers on press freedom.

6. Cronbach's alpha measures how closely related a set of items are as a group. As the average inter-item correlation increases, alpha increases as well. A "high" alpha (usually .70 or above) is considered a good measure of relatedness.

7. The one exclusive item is property rights the inclusion of which produces an alpha of .59, well below the acceptable threshold of .70. That such a variable is not linked to political development is not far-fetched. Property rights in the African context have never been construed as a beacon of the rule of law and civil rights extending to the masses (Henrysson and Joireman, 2008).

8. This mean of 28.81 does not tally with the information in Table 1 because Sao Tome and Principe has a missing the value for Press Freedom and a PDI was therefore not calculated for it. The country was then not included in calculating the overall mean for the PDI.

9. Fixed line and mobile phone subscriptions are combined in our data. While there are strands of research that may require that the two be disaggregated (e.g., Hamilton, 2003), that kind of an operation is not necessary for the kinds of questions we address in this research.

10. Of course, level of diffusion cannot measure the extent of actual usage. Nor will it capture the kinds of transactions users typically undertake.

11. In Nigeria's case this agitation has pitted brother against brother, ethnic group against group, region against region, oil producers against non-producers, political party against political party, civilians against military, and governors against governed. The violence in the Niger Delta is as pronounced as any extant war anywhere in Africa (O'Neill, 2007).

12. For the avoidance of ecological fallacy, we must underscore that this is a macro-outcome. This does not mean that individual nations within these regions will have similar results. That is, the fact that Southern location is associated with the highest development does not mean every nation-state in that region will necessarily have an outcome better than states elsewhere.

13. The advance fee fraud named after the section of the Nigerian penal code which addresses fraud schemes.

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Table 1

Items measuring political development

Factor	Mean	*SD*
Judicial independence	6.58	3.94
Public sector corruption	2.81	0.93
Free and fair executive elections	0.85	0.71
Opposition participation in executive elections	0.73	0.45
Free and fair legislative elections	0.77	0.43
Opposition participation in legislative elections	0.77	0.43
Respect for physical integrity rights	4.15	1.91
Respect for civil rights	6.27	3.07
Women's rights	3.42	1.24
Press freedom[a]	2.79	1.04
Property rights[a,b]	---	---
Cronbach's Alpha for Political Development Index	= .84	

Note: [a]Recoded to make it amenable to an additive index. [b]Excluded from the final political development index.

Table 2

Coding and summary statistics

Variable	Coding	Mean	*S.D.*	PCOR
PDI	Political development index	28.81	11.55	--
PHONE	Subscribers per 100 inhabitants (fixed & mobile)	21.16	23.99	.456**
COMPUTER	Computer usage per 100 inhabitants	3.21	5.09	.334*
INTERNET	Internet usage per 100 inhabitants	4.07	6.42	.341*
INTCOM	ICT index of internet and computer	7.44	10.86	.372*
LogTPOP	Log of total population	15.69	1.61	-.323*
EDUC	% adult pop. completing primary school	52.56	25.81	.374*
ETHNICS	1 if only one majority/dominant group	0.40	(N=19)	.130
OIL	1 if net oil exporter, 0 otherwise	0.31	(N=15)	-.211
LogGDP	Log of GDP per capita	7.21	0.99	.282
GDPGR	GDP growth rate (2005 constant $)	0.38	5.25	.370*
WEST[a]	(N=15)	0.31	(PDI=30.93)	.127
SOUTH[b]	(N=11)	0.23	(PDI=36.15)[f]	.355*
EAST[c]	(N= 8)	0.17	(PDI=19.55)	-.367*
CENTRAL[d]	(N=11)	0.23	(PDI=20.99)	-.356*
ISLAND[e]	(N=3)	0.06	(PDI=42.00)	.302*

[a](Benin, Burkina Faso, Cote D'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo). [b](Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe). [c](Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, Tanzania, Uganda). [d](Angola, Burundi, Cameroun, Central African Republic, Chad, Congo, Congo Dem. Republic, Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe). [e](Cape Verde, Comoros, Seychelles). [f]Without South Africa on the list PDI = 35.36.

Two-tailed levels of significance: *p<.05; **p<.001.

Table 3

Baseline effects of ICTs on the Political Development Index

	Model for Phones	Model for Internet	Model for Computers	Model for Index
ICT Effect	.46***	.34*	.33*	.37*
	(3.44)	(2.43)	(2.32)	(2.63)
Constant	24.188***	26.402***	26.082***	25.619***
Adj. R^2 (%)	19.0	9.7	9.1	11.8
F-Ratio	11.82***	5.92*	5.39*	6.89*
N	48	48	46	45

Note: Entries are standardized OLS regression coefficients. Figures in parentheses are t-statistics.

*p<.05; **p<.01; ***p<.001.

Table 4

Multivariate analysis of effects on the Political Development Index

Variable	Phone	Internet	Computer	Index
Level of phone diffusion	.46*			
	(1.73)			
Level of internet diffusion		.08		
		(0.39)		
Level of computer diffusion			-.05	
			(0.26)	
ICT index (computer/internet)[a]				.03
				(0.12)
Log of population	-.12	-.02	-.03	-.02
	(0.63)	(0.10)	(0.13)	(0.11)
Log of GDP per capita	-.25	.08	.11	.09
	(0.83)	(0.33)	(0.47)	(0.38)
GDP growth rate (constant $)	.32**	.31**	.30**	.31**
	(2.34)	(2.18)	(2.14)	(2.14)
Ethnic diversity	-.11	-.09	-.08	-.09
	(0.66)	(0.55)	(0.46)	(0.58)
Educational level	-.08	-.01	.11	.02
	(0.39)	(0.04)	(0.19)	(0.08)
Oil exporter	-.15	-.20	-.20	-.20
	(0.99)	(1.36)	(1.34)	(1.36)
Western sub-Sahara	-.22	-.21	-.21	-.20
	(1.29)	(1.15)	(1.15)	(1.13)
Eastern sub-Sahara	-.36**	-.39**	-.39**	-.39**
	(2.24)	(2.43)	(2.40)	(2.42)
Central sub-Sahara	-.47***	-.49***	-.50***	-.49***
	(2.88)	(2.87)	(2.88)	(2.84)
Island sub-Sahara	-.01	.04	.06	.05
	(0.07)	(0.22)	(0.38)	(0.29)
Constant	68.381	33.188	30.932	32.117
Adj. R^2 (%)	39.5	34.0	33.8	33.7
F-ratio	3.49***	2.97***	2.95***	2.94***
N	43	43	43	43

Note: Entries are standardized OLS regression coefficients. Figures in parentheses are t-statistics. Reference category for region is Southern sub-Sahara. [a]alpha is .84.

*p<.05, one-tailed test; **p<.05, two-tailed test; ***p<.01, two-tailed test.

Table 5

Multivariate analysis of effects on the Political Development Index

Variable	Model 1	Model 2	Model 3	Model 4
Level of phone diffusion	.58*	.58*	.86*	.80+
	(2.37)	(2.20)	(2.35)	(1.79)
ICT index (computer/internet)[a]	-.11	-.10	-.43	-.51
	(0.46)	(0.26)	(1.55)	(1.07)
Phone*ICT index		.01		.11
		(0.03)		(0.21)
Log of population			-.23	-.23
			(1.14)	(1.09)
Log of GDP per capita			-.43	-.42
			(1.38)	(1.27)
GDP growth rate (constant $)			.30*	.30*
			(2.28)	(2.37)
Ethnic diversity			-.07	-.06
			(0.44)	(0.38)
Educational level			.00	.03
			(0.00)	(0.10)
Oil exporter			-.29	-.09
			(0.61)	(0.59)
Western sub-Sahara			-.25	-.24
			(1.45)	(1.41)
Eastern sub-Sahara			-.30+	-.30+
			(1.91)	(1.89)
Central sub-Sahara			-.50**	-.51**
			(3.13)	(3.06)
Island sub-Sahara			.03	.02
			(0.16)	(0.12)
Constant	23.270**	23.216***	91.934*	90.271*
Adj. R^2 (%)	20.3	18.4	42.2	40.3
F-ratio	6.61***	4.30**	3.55**	3.18**
N	45	45	43	43

Note: Entries are standardized OLS regression coefficients. Figures in parentheses are t-statistics. Reference category for region is Southern sub-Sahara. [a]alpha is .84.

+p<.05, one-tailed test; *p<.05, two-tailed test; **p<.01, two-tailed test; ***p<.001, two-tailed test.